

Appln No. 10/731,710
Amdt date October 5, 2005
Reply to Office action of July 14, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Please cancel claim 12.

Amend claims 1, 21 and 23 and add new claims 27-34 as follows:

1. (Currently Amended) A method for forming an ultra hard layer, comprising:

providing a refractory metal enclosure having an inner wall;

disposing a metallic liner within said enclosure, said liner having a thickness in the range of 0.005mm to 3 mm;

placing ultra hard material feed stock within said enclosure; and

sintering to convert said ultra hard material feed stock to a solid ultra hard material layer.

2. (Original) The method as in claim 1, wherein said refractory metal enclosure is formed of at least one of Nb, Mo, Ta, and other members of the IVB, VB and VIB families of the periodic table.

3. (Original) The method as in claim 1, wherein said metallic liner is formed of at least one of Fe, Co, and Ni.

4. (Original) The method as in claim 1, wherein said placing comprises sandwiching the metallic liner between the ultra hard material feed stock and the enclosure.

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5. (Original) The method as in claim 1, wherein said inner wall comprises a peripheral wall and disposing a metallic liner comprises disposing a metallic liner adjacent said peripheral wall.

6. (Original) The method as in claim 1, further comprising disposing a substrate material within said enclosure such that said sintering bonds said substrate to said ultra hard material layer.

7. (Original) The method as in claim 6 during sintering the liner and at least a compound of the ultra hard material feed stock form a eutectic having a melting temperature lower than a melting temperature of a eutectic of the substrate material.

8. (Original) The method as in claim 6 during sintering the liner and at least a compound of the ultra hard material feed stock and the enclosure form a eutectic having a melting temperature about the same as that of a eutectic the substrate material .

9. (Original) The method as in claim 6 during sintering the liner and at least a compound of the ultra hard material feed stock and the enclosure form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C

10. (Original) The method as in claim 1, wherein said disposing ultra hard material feed stock comprises disposing diamond feed stock material within said enclosure.

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11. (Original) The method as in claim 1, wherein said disposing ultra hard material feed stock comprises disposing cubic boron nitride feed stock material within said enclosure.

12. (Canceled)

13. (Original) The method as in claim 1, wherein said solid ultra hard layer includes a peripheral edge, said metallic liner includes a metallic material and said sintering causes said metallic material to infiltrate a portion of said ultra hard layer extending no further than 500 microns inward from said peripheral edge.

14. (Original) The method as in claim 1, wherein said sintering produces said ultra hard material layer to be substantially free of fractures, chips and cracks.

15. (Original) The method as in claim 1 during sintering the liner and at least a compound of the ultra hard material feed stock and the enclosure form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C.

16. (Original) The method as in claim 1, further comprising joining said ultra hard layer to a substrate to form a cutting element, and mounting said cutting element on a bit body.

17. (Original) The method as in claim 1, wherein said disposing a metallic liner within said enclosure comprises providing a strip of said metallic liner having opposed ends and

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spot welding said opposed ends to each other to produce a cylindrical shape.

18. (Original) The method as in claim 1, wherein the liner is in the form selected from the group of forms consisting of foils, rings, tubes, pastes, coatings, sputterings, and slurries.

19. (Original) The method as in claim 1, wherein the liner forms a continuous peripheral layer around the entire periphery of the enclosure.

20. (Original) The method as in claim 1, wherein disposing comprises disposing a metallic liner having a melting temperature lower than the melting temperature of the enclosure.

21. (Currently Amended) A method for forming an ultra hard layer, comprising:

providing a refractory metal enclosure having an inner wall;

disposing a liner within said enclosure;

placing ultra hard material feed stock within said enclosure ;

placing a substrate material within said enclosure over the feed stock, wherein the substrate material is different from a material forming the liner; and

sintering to convert said ultra hard material feed stock to a solid ultra hard layer, wherein during sintering the liner forms a eutectic having a melting temperature and wherein the substrate forms a eutectic having a melting temperature, wherein the melting temperature of the liner formed eutectic is within 310° C of the substrate formed eutectic [wherein a melting

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temperature of a eutectic formed during sintering between the liner, a compound of the ultra hard material, and the enclosure is in the range of about 1100°C to about 1410°C].

22. (Original) The method as in claim 21 wherein during sintering, the liner and at least a compound of the ultra hard material feed stock form a eutectic having a melting temperature about the same as that of a eutectic of the substrate material.

23. (Currently Amended) A method for forming an ultra hard layer, comprising:

providing a refractory metal enclosure having an inner wall;

disposing a liner within said enclosure[, the liner having a melting temperature lower than the enclosure];

placing ultra hard material feed stock within said enclosure; and

sintering to convert said ultra hard material feed stock to a solid ultra hard layer, wherein during sintering the liner forms a plastically deformable region for preventing the formation of cracks on the ultra hard material adjacent said plastic deformable region during a cooling phase of said sintering.

24. (Original) The method as in claim 23 further comprising placing a substrate material within the enclosure, wherein during sintering, the liner, the enclosure and a compound of the ultra hard material feed stock form a eutectic having a melting temperature lower than a melting temperature of a eutectic of the substrate material.

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25. (Original) The method as in claim 23 further comprising placing a substrate material within the enclosure, wherein during sintering, the liner, the enclosure and a compound of the ultra hard material feed stock form a eutectic having a melting temperature about the same as that of a eutectic of the substrate material.

26. (Original) The method as in claim 23 wherein during sintering, the liner, the enclosure and a compound of the ultra hard material feed stock form a eutectic having a melting temperature in the range of about 1100°C to about 1410°C.

27. (New) The method as recited in claim 1 wherein the liner does not include carbide.

28. (New) The method as recited in claim 1 wherein sintering converts said ultra hard material feed stock together with said liner to a solid ultra hard material layer.

29. (New) The method as recited in claim 21 wherein the substrate comprises tungsten carbide.

30. (New) The method as recited in claim 21 wherein a melting temperature of a eutectic formed during sintering between the liner, a compound of the ultra hard material, and the enclosure is in the range of about 1100°C to about 1410°C.

31. (New) The method as recited in claim 21 wherein the liner does not include carbide.

32. (New) The method as in claim 21, wherein said metallic liner is formed of at least one of Fe, Co, and Ni.

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33. (New) The method as recited in claim 23 wherein the liner does not include carbide.

34. (New) A method for forming an ultra hard layer, comprising:

providing a refractory metal enclosure;

disposing a liner within said enclosure;

placing ultra hard material feed stock within said enclosure; and

sintering to convert said ultra hard material feed stock together with said liner to a solid ultra hard material layer.